DRAFT

UNION CARBIDE
SISTERSVILLE

Solid Waste Management Units
Verification Investigation

1. South Inactive Site I (SWMU 1)

This unit consists of three trenches (old landfills which have subsided) each approximately forty (40) feet by fifteen (15) feet in size. The depth of the old landfills is approximately ten (10) feet. The trenches are partially filled with water. The wastes were disposed of in the early 1950's when the plant was starting up. Approximately 400 drums containing chlorosilanes, silicone oils and resins, and spent copper-silicone mass were discarded in this area.

The area is underlain by stiff silty clay up to forty (40) feet thick. A five feet thick layer of sand and gravel (at a depth of twenty-two feet) is present near Well 4. Water quality data from the four monitoring wells at this site show no organics and only trace levels of heavy metals (arsenic, chromium, copper and nickel). Analysis of soil samples above and below the burial area reveals no significant difference in concentrations of heavy metals (see Table 1).

The main focus of the investigation for the South Inactive site will be waste characterization. Samples of the water and waste in each trench will be collected and analyzed for metals and appropriate organics. Proposed sampling locations are shown on Figure 1. In addition, two of the samples will be analyzed for Appendix IX constituents.

Both discrete and composite samples of the material in the trench will be collected. One location in each trench will be bored and a composite sample taken of the first five (5) feet and one of the second five (5) feet. Boring will continue until the bottom of the fill material is encountered, so as to identify the vertical extent of waste. At all other locations discrete samples will be collected at two (2) and four (4) feet depths. In addition to sampling the waste material, two (2) samples of the liquid will be collected from each trench. This combination and number of samples should provide an adequate representation of the wastes placed in these landfills/trenches.

Steps will be implemented to determine if a fourth disposal site exists in the area. This will include discussions with plant personnel, field reconnaissance and soil borings, if necessary.

The analytical results of the waste sampling will dictate whether further investigation is necessary. If the waste contains no or only low levels of hazardous constituents which can be demonstrated not to present a threat to human health or the environment, then the trenches will be filled in and capped with a one foot thick layer of clay with an intrinsic permeability of 1×10^{-7} cm/sec.

If this demonstration cannot be made, additional groundwater monitoring wells will be installed downgradient from the trenches. It is expected that three new wells will be needed (probable locations are shown on Figure 2). In addition to installing groundwater monitoring wells, a proposal for either removing the wastes or leaving the waste in place and capping will be made.

All monitoring wells installed will be constructed in accordance with the designs and specifications in Attachment 1. These wells will be screened from the water table to a depth twenty (20) feet below the water table.

The Quality Assurance/Quality Control (QA/QC) procedures in Attachment 2 will be followed for all sampling, drilling and well installation.

2. North Inactive Site II (SWMU 2)

This site consists of three adjacent fill areas located north of the main plant. The total area of these three fills is approximately 2.2 acres. The area was used from 1961 to 1972. The depth of the fills is estimated to be twenty (20) feet. Various plant wastes including silicone gums, gelled methyl silicones, chlorosilanes, distillation column pot residues, cyanothytriethoxy silane heavies, toluene solutions, acrylonitrile, filter cakes from the production of surfactants, and miscellaneous wastes were placed in this area. Approximately 7,000 drums were discarded. The Copper Sludge Pit and Storage Pile (SWMU 13) and the Platinum Filter Cake disposal area (SWMU 15) were situated on top of the North Inactive site and will be addressed with it.

The area is underlain by alluvium composed primarily of silty sand, with some sandy clay and gravel. The current groundwater monitoring system consists of nine wells labeled the "NF" wells (North Forty wells). The NF wells and surrounding groundwater monitoring wells are shown on Figure 3. This figure also shows the location of the SWMU's included in this investigation. Water quality data from the NF wells reveal low levels of chlorobenzene and copper downgradient of the North Inactive site (primarily wells NF-8, NF-6 and NF-5A). These contaminants also exist in wells 12A, 13A and 21 which are located further downgradient.

Based on the evidence that groundwater contamination exists in this area, it is recommended that an RCRA Facility Investigation (RFI) be conducted instead of a Verification Investigation (VI). The purpose of the RFI will be to determine the rate and extent of contamination, and to make recommendations regarding the criteria for and scope of corrective measures.

The RFI will include the installation of eight (8) additional groundwater monitoring wells at the four (4) locations shown on Figure 4. Each location will contain a cluster of two (2) wells; one screened in the upper portion of the alluvial aquifer and the other screened in the bottom portion. All monitoring wells will be constructed in accordance with the designs and specifications in Attachment 1. Analytical data from these wells and the existing wells on site should fully characterize the nature and extent of contamination.

Pump test data from north (proposed Landfill No. 3) and south (remediation of contamination from the copper pond) of the North Inactive site will be used to determine average linear velocity, which will provide the rate at which contaminates are expected to be moving.

The first round of sampling will include a scan for Appendix IX constituents. Any additional sampling and analysis will be only for those constituents detected by the Appendix IX analysis.

In addition to the above groundwater investigation, it is recommended that the North Inactive site be covered with a modified RCRA cap. The cap shall include two (2) feet of 1×10^{-7} cm/sec permeability clay, covered by a one foot thick sand drainage layer (1×10^{-2} cm/sec), which will be overlain by eighteen (18) inches of topsoil. The topsoil and sand drainage layer will protect the clay liner from freeze/thaw effects. The cap will be placed after the site is regraded to an appropriate slope (2 - 5 %) by the addition of low permeability (1×10^{-5} or 1×10^{-6} cm/sec) fill. A run-on diversion ditch will be installed around the eastern portion of the area to prevent water from the hill from reaching the cap. The cap will be installed according to the designs and specifications in Attachment 3. This attachment includes QA/QC procedures that will be followed during cap installation.

The QA/QC procedures in Attachment 2 will be followed for all sampling, drilling and well installation.

A detailed description of the geology at the four new well sites will be made by collecting continuous samples using a split-spoon sampler or a continuous sampler device. This will be done only in the deep hole at each cluster location. This data and geologic data from nearby existing wells will be used to construct at least two geologic cross-sections.

Water level data in the new wells, existing NF wells, EP Area wells and the "Copper Pond" wells will be recorded monthly during this study and several groundwater contour maps will be developed. Separate maps will be constructed for data from shallow and deep wells. Vertical flow gradients will be determined by comparing water levels in shallow and deep wells in each cluster. Well hydrographs and flow nets will be included where appropriate.

Based on the concentration, extent and rate of migration of contamination from the North Inactive Site II, a proposal will be made to develope a remedial action program for this site (North Inactive Site II) or to tie remediation into the corrective action program for the Copper Pond.

3. Waste Drum Staging Areas (SWMU 7)

There are ten (10) locations where waste is stored in drums for less than ninety (90) days. A Verification Investigation will be conducted at each of these sites. The investigation will include sampling of soil at places where contamination would be likely in case of a release.

The following is a list of the ten (10) drum staging areas.

(1) D & C (South Charleston)
(2) Polymers II (south end)
(3) Small Scale Production (SSP)
(4) Polymers I (north end)
(5) Distribution
(6) Laboratory
(7) R & D
(8) Silanes - Esters
(9) Silanes - Monomers and Intermediates
(10) Contract Maintenance Room

Attachment 4 includes a brief description of each site and a discussion of sampling and other measures that will be conducted at each.

4. No. 3 Sludge Pond (SWMU 9)

This pond was a 450,000 gallon clay (18 inches thick) and limestone lined settling basin. It began operation in 1973 and was closed in April of 1986. The pond was used for settling copper hydroxide [$Cu(OH)_2$] from a non-hazardous waste stream.

Closure of this impoundment included removal of all waste sludge and placing clay fill in the pond. Approximately twelve (12) feet of clay (compacted in lifts) was placed in the pond. Soil that was left in place contained copper (29 to 104 ppm) and zinc (see Tables 2 to 4).

Because analytical data from soil samples in the pond exist and Union Carbide (UCC) does not wish to disturb the clay fill, it is recommended that no additional soil samples be collected. Instead, as part of the VI, a cluster of two (2) groundwater monitoring wells will be installed immediately downgradient of the No. 3 Pond. Background wells already exist upgradient of the unit. The monitoring wells will be sampled for metals, indicators (e.g. pH, TOC, specific conductance and TOX) and ions.

The location of the monitoring well cluster is shown on Figure 5. The monitoring wells will be constructed in accordance with the designs and specifications in Attachment 1. The QA/QC procedures in Attachment 2 will be followed for all sampling, drilling and well installation.

If significant contamination does exist from releases from this pond, the extent of contamination will be determined and remedial action will be tied into the Copper Pond and/or North Inactive Site II corrective action program(s).

5. Copper Shanty (SWMU 14)

The copper shanty is an approximately 5,000 gallon in-ground concrete tank connected by pipeline to the methychlorosilane and trichlorosilane

production processes. Waste from these processes was reacted with water in this unit and the resultant material pumped into the Copper Sludge Removal Pond (SWMU 29).

This unit began operation in 1976 or 1977 and has been inactive since the end of 1987. The waste managed contained silicon, chlorosilanes, copper and zinc. Also, the reaction in the unit formed hydrochloric acid (HCl).

A VI is proposed for this unit. The investigation will include soil sampling. Prior to conducting the investigation, the Copper Shanty and associated equipment will be dismantled and disposed of appropriately. A foot or two of underlying soil will be removed and discarded.

The soil underlying the unit (i.e. below the removed soil) will be sampled at four (4) locations. The locations are shown on the map in Figure 5. Samples will be collected at depths of one (1) ,two (2) and four (4) feet. The samples will be analyzed for metals (including copper and zinc), pH and TOC. One or two samples (from the one foot depth) will be analyzed for Appendix IX constituents.

Numerous groundwater monitoring wells exist downgradient of the Copper Shanty (see Figure 3). No additional monitoring wells are proposed. Any contamination migrating from this unit will be detected in the "Copper Pond" wells and will be remedied by the corrective action program for the Copper Pond.

Based on the results of the soil sampling and analyses one of the following actions will be chosen.

(1) Conduct additional soil sampling and analysis to determine nature and extent of contamination.
(2) Remove contaminated soil and dispose of properly; then fill in the area with clean soil.
(3) Leave soil in place and cap with a clay or synthetic liner.
(4) Leave soil in place and fill in to ground surface (Note: This option assumes that the soil is not contaminated).

6. Contaminated soil under No. 1 Settling Basin (previously unidentified)

During closure of the No. 1 Settling Basin, contaminated soil was identified under the clay liner in the southeast corner of the basin. The contamination does not appear to have originated from the existing settling basin or the nearby hydrolysis reactor. It is believed the contamination is from past disposal activities in the area.

Analysis of the soil reveal it contains toluene, ethylbenzene and other organics (not quantifiable). Based on visual observation, contaminated soil appears to be less contaminated (if at all) to the north and west. Extent of contamination to the east, south and with depth (i.e. vertical extent) is unknown. It is noted that the soil was stained to a depth of at least fifteen (15) feet below the bottom of the settling basin in the southeast corner.

It is proposed to conduct soil sampling at four (4) locations as shown on Figure 6. Holes will be bored with hollow stem augers and samples collected with a split-spoon sampler at depths of ten (10), fifteen (15) and twenty (20) feet. The samples will be analyzed for metals and Appendix IX constituents. The QA/QC procedures in Attachment 2 will be observed for all sampling and drilling.

No additional groundwater monitoring wells are required at this time. An existing monitoring well (Well 21) is located downgradient of this area (see Figure 3). This well has low levels of chlorobenzene, but it's origin appears to be the North Inactive Site II.

The appropriate action to be conducted next will be established by the analytical results of the soil samples. This could include additional soil sampling, installation of groundwater monitoring wells, soil excavation, placing a cap over the contaminated area and/or "no action".

If contamination is later confirmed to be present in the groundwater, it will be addressed with the corrective action program for the Copper Pond.